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Combinatorial optimization problems in ultrametric spaces

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Abstract

We study the solutions of some known combinatorial optimization problems including the minimum matching problem, the minimum spanning tree problem, and the traveling salesman problem in d-dimensional p-adic spaces. It appears that the "greedy" algorithms yield the optimal solutions of these problems in the ultrametric space, which allows obtaining explicit expressions for the estimates of their averages. We study the asymptotic behavior of these averages as the number of points increases infinitely and und some similarities to the Euclidean case, as well as new, unexpected properties.

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Keywords

Greedy algorithms, Minimum matching, P-adic spaces, Renormalization group, Self-averaging property, Traveling salesman problem, Ultrametricity